

Application No. 10/064,785
Docket No. 13DV-14066
Amendment dated April 5, 2004
Reply to Office Action of March 4, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claims 1-20 (canceled)

Claim 21 (amended): A thermal barrier coating ~~(26)~~ on a surface of a component ~~(10)~~, the thermal barrier coating ~~(26)~~ comprising a thermal-insulating material of yttria-stabilized zirconia alloyed with at least a third oxide having an absolute percent ion size difference relative to a zirconium ion of at least 13 percent, the third oxide being present in the thermal-insulating material in an amount sufficient to increase lattice strain energy of grains of the thermal barrier coating ~~(26)~~, the thermal barrier coating ~~(26)~~ containing elemental carbon, carbides, oxycarbides and/or a carbon-containing gas.

Claim 22 (amended): A thermal barrier coating ~~(26)~~ according to claim 21, wherein the third oxide is selected from the group consisting of ceria, magnesia, calcia, strontia, barium oxide, lanthana, neodymia, gadolinium oxide, dysprosia, ytterbia and tantala.

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Claim 23 (amended): A thermal barrier coating ~~(26)~~ according to claim 22, wherein the thermal-insulating material is alloyed with an additional oxide selected from the group consisting of ceria, magnesia, calcia, strontia, barium oxide, lanthana, neodymia, gadolinium oxide, dysprosia, ytterbia and tantala.

Claim 24 (amended): A thermal barrier coating ~~(26)~~ according to claim 21, wherein the third oxide is ceria.

Claim 25 (amended): A thermal barrier coating ~~(26)~~ according to claim 24, wherein the thermal-insulating material contains about 10 to about 20 weight percent ceria, the balance essentially zirconia stabilized by about 4 to about 8 yttria.

Claim 26 (amended): A thermal barrier coating ~~(26)~~ according to claim 21, wherein the elemental carbon, carbides, oxycarbides and/or carbon-containing gas are within pores ~~(32)~~ that are within grains and at and between grain boundaries of the thermal-insulating material.

Claim 27 (amended): A thermal barrier coating ~~(26)~~ according to claim 26, wherein at least some of the pores ~~(32)~~ contain elemental carbon.

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Claim 28 (amended): A thermal barrier coating ~~(26)~~ according to claim 26, wherein at least some of the pores ~~(32)~~ entrap the carbon-containing gas.

Claim 29 (amended): A thermal barrier coating ~~(26)~~ according to claim 28, wherein the carbon-containing gas is at least one gas chosen from the group consisting of carbon monoxide and carbon dioxide.

Claim 30 (amended): A thermal barrier coating ~~(26)~~ according to claim 26, wherein at least some of the pores ~~(32)~~ contain the elemental carbon, at least some of the pores ~~(32)~~ contain carbides or oxycarbides, and at least some of the pores ~~(32)~~ entrap the carbon-containing gas.

Claim 31 (amended): A thermal barrier coating ~~(26)~~ according to claim 21, wherein the microstructure of the thermal barrier coating ~~(26)~~ consists of columnar grains ~~(30)~~ so that the microstructure is columnar, or flattened grains ~~(30)~~ so that the microstructure is noncolumnar and inhomogeneous.

Claim 32 (amended): A thermal barrier coating ~~(26)~~ on a surface of a superalloy component ~~(10)~~, the thermal barrier coating ~~(26)~~ comprising:
a bond coat ~~(24)~~ on the component ~~(10)~~;

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a thermal-insulating material of yttria-stabilized zirconia alloyed with about 10 to about 20 weight percent ceria, the thermal insulating material having a columnar microstructure with pores ~~(32)~~ and sub-grain interfaces within, at and between grain boundaries of the microstructure, at least some of the pores ~~(32)~~ containing elemental carbon, carbides, oxycarbides, and/or a carbon-containing gas.

Claim 33 (amended): A thermal barrier coating ~~(26)~~ according to claim 32, wherein at least some of the pores ~~(32)~~ contain the elemental carbon, at least some of the pores ~~(32)~~ contain carbides or oxycarbides, and at least some of the pores ~~(26)~~ entrap the carbon-containing gas.

Claim 34 (amended): A thermal barrier coating ~~(26)~~ according to claim 32, wherein the thermal-insulating material comprises a ternary reaction product of ceria and the elemental carbon.

Claim 35 (amended): A thermal barrier coating ~~(26)~~ according to claim 34, wherein the ternary reaction product comprises carbides and/or oxycarbides.